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OF
VIETNAM-ERA VETERANS

by

Erdinc Soyak

December 1987

Thesis Advisor S. L. Mehay

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POST-SERVICE EARNINGS OF VIETNAM-ERA VETERANS

by

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

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December 1987

ABSTRACT

This thesis analyzed the effect of military service and military training on post service earnings using the National Longitudinal Survey of young men (14 to 24 years of age in 1966). When data were disaggregated by race and veteran status, some differences appeared between the earnings of veterans and non-veterans. A Chow test indicated that the data could not be pooled for blacks and non-blacks. An analysis of earnings revealed that the effect of veteran status on post-service earnings is inconclusive. Further analysis of wage equations and annual income equations of veterans showed that veteran status does not have significant returns from either military training or time spent in the service.

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I. INTRODUCTION

A. INTRODUCTION

The effect of military service on the post-service earnings of veterans has been the subject of incentive research. The extent to which the military contributes economic benefits to subsequent civilian employment is twofold. First, it is of considerable interest to military recruiters and manpower planners, particularly in light of projections on future enlistment shortfalls. Binkin and Eitelberg found that while the military is enlisting 50 percent of the qualified and available pool[1] (traditionally 17-21 year old males) in 1984-1988, it will have to draw 55 percent of them in 1991-1995, due to declining numbers of youth population [Ref. 1: p. 91]. This finding suggests that in the near future the armed forces will find it more difficult to recruit sufficient numbers of new people with the appropriate mix of qualifications.

Second, many young people may see the military as a source of gaining work skills and experience and an investment in their future. Binkin and Kyriakopoulos indicated that approximately 78 percent of the enlistees do not complete more than one tour of duty [Ref. 2]. In this case, the effect of military service is important to individuals both in terms of skills gained in the armed forces and society in terms of resources used effectively.

The main objective of the military is to train troops for combat and to contribute directly to readiness. For fiscal year 1988, the military planned to spent $19 billion for individual training. About 191,900 personnel are engaged in the support of training, with a workload of 261,200 student-years [Ref. 3: pp. VIII-4,D-2]. However, the effect of military training on post-service earnings is not clear. Clark and Sloan stated that 60 percent of military training is applicable to the civilian occupations [Ref. 4: p. 103]. On the other hand, some recent studies indicated that the effect of military training on post-service earnings is negative [Refs. 5,6: pp. 22,109].

Transferability of military training to the subsequent job is important to individuals. The time spent in the military would result in a loss for veterans if they could not use their military skills in the civilian job. This issue is more important

---

[1]The portion of the young men who are institutionalized, expected to enter collage and completed least two years, and not met current mental, physical, or moral standards are not considered as qualified and available.

during compulsory service, in terms of the tax levied on draftees. However, if separatees use their service-acquired training in the post-service jobs, the military's loss may be partly compensated by a gain accruing to society [Ref. 7].

B. PURPOSE

This thesis attempts to determine the following hypotheses:

1. Earnings-related factors that veterans posses are similar to those of the population from which they were drawn.
2. The data can be pooled for blacks and non-blacks as well as veterans and non-veterans.
3. Being in the service has no different impact from being in the civilian labor force on the later earnings of the individuals.
4. Military service is no different in effect from training and work experience in the civilian sector when impact is measured by income received in subsequent civilian job.

The next section will present a short summary of the past studies and a categorization of findings of previous researchs. The second chapter is the description of the data set and definition of variables along with methodology. Chapter III examines the earnings factors possesed by veterans and non-veterans by race. Chapter IV tests the hypothesis that data can be pooled for blacks and non-blacks as well as veterans and non-veterans and estimates the earnings equations. Chapter V identifies the effect of military service on post-service earnings of veterans. The last chapter summarizes the results and present recommendations.

C. REVIEW OF PAST STUDIES

Chamarette and Thomas in 1982 [Ref. 5: pp. 4-6], Reams in 1983 [Ref. 6: pp. 17-43], and Higgins in 1984 [Ref. 8: pp. 15-24] have systematically reviewed the literature in the field of subsequent civilian earnings of veterans. A summary of these works is presented in Table 1.

This paper digests four more recent studies and classifies the findings of past studies from a policy perspective. The first study, which was not summarized by Reams, was Chamarette and Thomas. They found that black Vietnam veterans have relatively disadvantaged family backgrounds, whereas the reverse is true for white Vietnam veterans, and that length of military training is not associated with positive post-service earnings [Ref. 5: pp. 81-84]. The second study, by Higgins, stated that bonafide first-term enlistees tend to have positive returns to their veteran status. The

TABLE 1

A SUMMARY OF PAST STUDIES

DATE AND PURPOSE	METHODOLOGY	RESULTS AND CONCLUSIONS
1. Cutright 1972. Analyze the determinants of earnings and measure the effects of military svc on civilian earnings.	Compared army vets and non-vets. Controlling for age, education, race and IQ.	Earnings of vets are not higher than comparable non-vets.
2. Norrblom 1976. examines the economic effect of formal and OJT military training acquired in the military.	Regression analysis semi-log function. No compare son of vets non-vets was made.	Formal vocational training has a positive effect on post service earnings.
3. Browning, Lopreato, & Poston 1975. Study effects of military service for minority men on civilian earnings.	Comparison of mean incomes controlling for race,education, and occupation.	Minority vets earn more than minority non-vets, supporting the bridging environment hypothesis.
4. Lopreato & Poston 1977. Study effects of bridging hypothesis of military service.	Compares earnings after regression analysis by vet status. Controlling for education, age and employment.	Black vets are better able to convert educational attainment into earnings advantages than black non -vets.
5. Martindale & Poston 1979. Examines earnings patterns for 3 groups of vets & non-vets.	Compares earnings after regression analysis by vet status. Controlling for education, employment, marital status, race.	Blacks and Mexican Americans are better able to convert characteristics into higher earnings than non-vets.
6. Little&Fredland 1979. Examines earnings of vets non-vets some 20 years after most served.	Cross-sectional study utilizing regression analysis controlling any factors that contribute to earnings.	Vets had a 5 to 10% premium on earnings.
7. DeTray 1980. Examines earnings differences between vets non-vets.	Cross-sectional study utilizing regression analysis controling for many factors that contribute to earnings.	Vets earn more than non -vets. Training received in the military increases civilian wages.
8. Bolin, Hess & Little 1980. Utilizes human capital approach to compare the values of vocational training over time.	Regression analysis controlling for many factors that contribute to earnings, in particular the use of civilian and military training.	Use of military training doesn't have a positive effect. Vets with no in service vocational training have a negative earnings effect from military service.

TABLE 1

A SUMMARY OF PAST STUDIES (CONT'D.)

DATE AND PURPOSE	METHODOLOGY	RESULTS AND CONCLUSIONS
9. Hess 1980. Examined the value of military svc for initial entry into civilian employment.	Compared vets & nonvets initial employment earnings controlling for many factors.	Initial job entry earnings of vets were higher than nonvets, but to a lesser degree during economic slowdowns.
10. Bolin 1980. Examined earnings effects from military and civilian vocational trng.	Longitudinal study using regression analysis controlling for many factors incl voc trng.	Vocational trng, gained from military civilian source is beneficial to the individual.
11. Fredland & Little 1980. Investigates returns to earnings from in-service voc. trng received by World War II vets.	Compares earnings effects of civilian and military voc. trng of vets & nonvets.	Military and civilian voc trng yields a premium to long-term earnings for those who use it on the job.
12. Fredland&Little 1979. investigates specific attributes of the bridging hypothesis.	Regression analysis to determine effects of mil svc and descriptive analysis to examine bridging variables.	Bridging hypothesis could not explain differences in earnings of vets & nonvets. Educational differences were important.
13. DeTray 1982. Examines the hypothesis that vet status acts as a screening device for employers.	Regression analysis con trolling for age,educ. residence to determine vet earnings premium.	Vet status was found to act as a valuable screening device. But it couldn't account for the differences alone.
14. Danzon 1980. examines second career earnings loss of military retirees.	Regression analysis to examine earnings differ ences of mil retirees and non-career vets.	Military retirees earn 10 to 20 percent less than non career veterans.
15. Cooper 1981. Examines military retirees post-service earnings and employment.	Regression analysis to examine earnings differ-ences of mil retirees & non-retired veterans.	Military retirees earn 20% less than non-retired vets but worked less. If working full time, they do very well in earnings.

(Source: Reams, O. P., Masters Thesis, Naval Postgraduate School, Monterey, CA, June 1983.)

study also developed criteria for a single term of enlistment using length-of-service in a particular branch of armed forces [Ref. 8: p. 91]. The third work is by Goldberg and Warner. They concluded that military experience increases post-service earnings, but that the relative effect of military experience and civilian experience differ by military occupation category [Ref. 9]. Schwartz found that if only the annual earnings of Vietnam veterans and non-veterans were compared there was no significant difference between the two. However, when some control variables were taken into account, Vietnam veterans were worse-off than non-veterans in the rate of return per year of education [Ref. 10]. A summary of the most recent studies is presented in Table 2.

1. **Chamarette and Thomas (1982)**

The paper ***Civilian Earnings of Vietnam Veterans*** tested two major hypotheses. They were: (1) earnings-related factors possesed by veterans were similar to those in the population from which they were drawn, and (2) the existence of post-service earnings premiums that were received by veterans [Ref. 5: p. 2]. Chamarette and Thomas hypothesized that if military training and work experience were a means of investment in human capital, veterans would have a positive earnings premium over non-veterans.

The data set used was the 1976 National Longitudinal Survey (NLS) of young men who were aged 14 to 24 years old in April 1966. Chamarette and Thomas restricted veteran status to those who had served twenty-four months or more in the military. Their purpose was to give enough time for veterans to get adequate military training and experience, to remove the enlisted reserves and personnel who were actually dissatisfied with military, and to assess the possible effects of military training on draftees.

The researchers used the hourly wage and yearly income to measure civilian earnings. For their first hypothesis, they tested whether earning factors were different for black veterans, black non-veterans, white veterans or white non-veterans. Results indicated that the black veteran sample had many advantages in employability and income generation over the non-veteran group. On the other side, the white non-veteran sample was generally superior to the white veteran group. Since these findings were limited to cross-sectional data, they presented a graphical representation of the same cohort members' earnings to give a possible indication of longitudinal benefits. Results indicated that income obtained by white non-veterans is steadily higher for all age groups than that of white veterans except for those 32 years old.

TABLE 2

A SUMMARY OF THE MOST RECENT STUDIES

DATE, AUTHOR, AND PURPOSE	METHODOLOGY	RESULTS AND CONCLUSIONS
1. Chamarette & Thomas 1982. Compares earnings factors of vets non-vets. Examines the earnings differences of vets non-vets and the effect of military training.	Conduct a semi-log regression analysis to determine the effect of earnings factors on the annual income.	Black vets have earnings factor advantages over black non-vets. Reverse is true for whites. Vet status have no impact on earnings by itself. Military training does not have significant returns.
2. Higgins 1984. Tests the appropriateness of the log-linear equation in estimating life time earnings. Explains the returns to vet status. Develops a full time criterion. Tests the minimum length of service criterion.	Log-linear regression analysis was conducted for every panel of NLS survey and for pooled data by race and by vet status.	Log-linear function is proper for determining the relationship between human capital factors. Vet status is a good screening device. Full time and minimum length of service criteria should be included in the analysis.
3. Goldberg & Warner 1986. Examines the effect of civilian and military experience on the earnings of vets with the objective of determining the substituteability of these two kinds of experience.	Regression analysis was conducted for determining the quadratic earnings equation.	White vets earn more than non-white vets. Vets trained in white collar occupations have higher earnings growth than veterans trained in blue collar occupations. Transferability of military experience with civilian experience depends on the occupation category.
4. Schwartz 1986. Compares the earnings of Vietnam vets to those of Korean vets on both cases relative to non-vets.	Linear regression analysis was conducted, controlling the education, race, age, marital status.	Vietnam vets are worse off than their non-vet contemporaries in their rate of return per year of education. Korean vets were economically undistinguishable from non-vets.

A regression analysis was conducted to test the second hypothesis for both whites and blacks. They structured a semi-logarithmic function to reduce the positive skewness of earning distribution. By doing so, they likely enhanced the statistical fit of the equation. They concluded that veteran status had no effect on earnings by itself. White or black veterans that did not gain vocational training or further education in the military could not hope for increased earnings from military service. White

veterans who gained further education or vocational training could make a contribution to their post-service earnings. But, for black veterans, obtainment of vocational training in the military did not give civilian earnings premium.

To determine the effects of different kinds of participations in the military, they conducted a similar regression analysis by including three different independent variables. Those were: (1) time spent in the military, ranging from 2 to 8 years, (2) months of training in addition to "boot camp", (3) the time spent in civilian life since the completation of a military tour. They concluded that time spent in civilian life since active duty has three percent positive returns for each year, while there were no significant returns to either military training or branch of service. White veterans earned a 19 percent earnings premium over black veterans.

2. **Higgins (1984)**

Higgins' thesis, ***Specification of Veteran Status in Estimating, Post-Service Civilian Earnings***, tested the following hypotheses:

a. Human capital factors tended to contribute to the income of an individual and that income tended to rise rapidly during the first years of participation in the labor force and to level off in later years, allowing the use of a log-linear regression equation to capture the relationship;

b. Bonafide first term enlistees tend to have different returns to their veteran status than veterans as a whole and multi-term veterans in particular, and that these returns, on average, tended to be a negative;

c. Fully employed individuals tend to follow the pattern of log-linear relationships between income and the human capital factors more closely than those not meeting that criterion. [Ref. 8: pp. 11-12]

The data set used was NLS of 5,225 young men aged 14 to 24 in 1966. There were 11 panels of the survey stretching over a fourteen-year period from 1966 to 1980. Almost all variables were drawn from the same source except two of them, rate of change of Gross National Product (GNP) for a given year as compared to the base year of 1966 and levels of unemployment throughout the period. The last two variables were obtained from Organization for Economic Cooperation and Development (OECD) [Ref. 8].

Higgins determined ***eligibility*** criteria for inclusion in the sample. The individuals must be at least eighteen years old, in the workforce, did not received any unemployment compensation in the last year, worked 38 weeks and had income of at least $1500 per year. He employed a log-linear equation and adjusted the coefficients of dichotomous variables to better represent changes in dependent variables due to

changes in independent variables. A natural logarithm of wages and salaries was used as an independent variable. Individuals spending at least one month on active duty were classified as veterans.

He analyzed the data in three phases. The first phase consisted of three steps also. In the first step observations were pooled from each of the eleven years in which the survey was conducted. The most important findings of this section were that: (1) fifteen of the sixteen variables were significant at the 0.0001 level; (2) positive returns to veteran status of Vietnam-era men, were observed. The second step disaggregated the data set first by veteran status and then by race. In the former, he found that all but two of the variables were significant for both veterans and non-veterans. The most important difference between the veteran equation and the non-veteran equation was the coefficient of determination. It was .450 for non-veterans and .325 for veterans. He concluded that this difference might be due to absence of variables that would account for the special cases in the military environment. In the latter he found that returns to additional year of experience were lower for blacks than either whites or whole samples. Being a black had a negative impact of $1,110 on annual income. Both whites and blacks have a positive returns to veteran status of $602 and $205 respectively. The third step was the disaggregation of the data set by race and by veteran status at the same time. In this step, returns to experience were larger for whites than blacks, as in the previous steps. However, black non-veterans had higher returns than black veterans, but lower returns than whites in general.

The second phase involved two stages. In the inital stage, pooled time-series / cross-sectional data were disaggregated into the years. By having different equations Higgins was able to determine the effect of aging the cohort and changes in the economy on the lifetime earnings of the sample members. He concluded that average annual income had increased while the returns to an additional year of experience had decreased. Average annual income was $2,000 higher in 1980 than the average income in 1966. A second important finding was that earnings premiums associated with whites had decreased. The reverse was true for blacks, except during recession periods. Being a member of a union had a positive effect on earnings. The following stage disaggregated each year by race and by veteran status. The returns to veteran status were positive every year. In the next stage he first disaggregated the data by year and then by veteran status. His findings supported his results from the pooled data set. The returns to experience were smaller for veterans compared to non-veterans. The

returns to civilian vocational training were lower for veterans throughout the period. Secondly, he disaggregated the data set by year and by race. The only noteworthy result from this stage was that the return to civilian vocational courses was higher for blacks than for whites, S747 and S433, respectively.

The final phase of the analysis disaggregated the data by race, veteran status, and year simultaneously. Since the sample size was divided into smaller groups, most of the variables were insignificant, especially those of black non-veterans. Experience tended to have smaller returns for white veterans than for white non-veterans. Being a member of a union was more important for white non-veterans than white veterans. Blacks that lived in the South had much smaller incomes than did whites. The average income for the group and the returns for each additional year of experience decreased for black non-veterans over the period.

Later, he defined veteran status by minimum length of service. The minimum length of service ranged from 0 to 24 months. He concluded that minimum length of service criterion should be included in order to exclude reservists.

Using the 1980 data, he ran the regression analysis first including ***experience*** then excluding it. He found that the premium for an additional year of experience is smaller for veterans, and the premium for being a veteran is significantly higher when the variable experience is not used, supporting the hypothesis that veteran status is used as a screening device by employers.

Finally, in order to obtain a set of observations fitting the ***fully employed*** criteria, he tested a lot of data sets and concluded that more stringent employment criteria resulted in a more homogenous data sets.

3. **Goldberg and Warner (1986)**

In their article, ***Military Experience, Civilian Experience, and the Earnings of Veterans***, Goldberg and Warner examined:

> the effect of civilian experience and military experience on the earnings of veterans with the objective of determining the substituteability of these two forms of experience for personnel receiving the different types of training. [Ref. 9]

The data set consisted of 24,000 people who left the armed forces in 1971. Earnings of those people were obtained from the Social Security records for the years 1972 through 1977. In these data, the authors did not use control groups (i. e., non-veterans). Hence, their sample was relatively more homogeneous than most of the samples used in prior studies.

The data were grouped into cells based on branch of service, two digit occupational group, and length of military service. They sampled the 30 most heavily populated two-digit groups within each of the four branches of service and grouped the data into 8 length-of-service intervals. As a result they obtained 4 x 30 x 8 = 960 possible cells. From each cell with 40 or more observations 40 individuals were selected randomly. After deleting the observations without annual earnings they came up with 3,970 observations.

They used regression analysis for determining the quadratic earnings equation. In their analysis they included years of military experience, years of civilian experience and their squares, interaction of military and civilian experience, along with the other variables.

In the first part of their paper, they estimated the earnings equations by including civilian experience squared. They found that whites earn more than non-whites. Veterans trained in "blue collar" military occupations have lower civilian earnings growth than veterans trained in the "white collar" occupation groups. Individuals with more experience earn more than individuals with less experience. One of the most important findings was that the experience gained from military medical, electrical, and mechanical occupations was a perfect substitute for its civilian counterpart.

Finally, they estimated the same equations by excluding the civilian experience squared and the resulting estimates changed very little, implying that earnings equations can be estimated without using civilian experience squared.

4. **Schwartz (1986)**

Schwartz compared the relative post-service earnings of Vietnam-era veterans and Korean-era veterans with each other and their non-veteran counterparts in his article ***The Relative Earnings of Vietnam and Korean-Era Veterans*** [Ref. 10]. In the first part of his study he summarized the conflicting views about the effects of military service on post-service earnings of veterans in general and then compared the Korean and Vietnam veterans in particular. His findings are summarized as followed:

a. Veterans Earn the Same or More.

He gave three reasons for veterans to earn the same or more: (1) only people who have high scores on physical and mental tests are recruited; (2) some training activities are available only to veterans; (3) the services acquire veterans with "bridging environment", providing opportunities to obtain skills necessary to succeed in the marketplace.

b. Veterans Earn Less.

The reasons for this view were: (1) veterans are likely to start their civilian lives behind non-veterans of same age; (2) the education accrued by veterans in the military may be of little value in the civilian jobs; (3) some veterans may have some service-related disabilities; (4) veterans earn less because the most able people generally avoid the armed forces.

c. Vietnam veterans Earn Less than Korean-Era Veterans.

Rationale under this idea was: (1) since the war was unpopular, Vietnam veterans were not welcomed back with open arms in the civilian society, (2) drug addiction and alcohol abuse were very common among Vietnam veterans as compared the other war-era veterans, (3) war time activities of Vietnam veterans made them unpopular, and (4) the G.I. Bill was less generous for Vietnam-era veterans than for Korean-era veterans.

d. Vietnam Veterans Earn More Than Korean Veterans.

The reasons for this view were: (1) a number of training activities were available to Vietnam veterans but not to Korean veterans, (2) Vietnam veterans probably had higher level of education than Korean veterans.

Schwartz used the Current Population Survey (CPS) data for the years 1968 and 1980. By using 1968 data for Korean veterans and 1980 data for Vietnam veterans he was able to compare both war veterans at similar points in their work lives. He analyzed the data by using linear regression model. The dependent variable was the natural logarithm of annual individual earnings.

He found that Vietnam veterans and Korean veterans had almost the same education level but Korean veterans had a higher rate of return to their education. Annual earnings of Vietnam veterans fairly equal to those of their non-veteran counterparts, but their returns to educations were less than non-veterans. Finally, determinants of earnings for Vietnam veterans were significantly different from those of non-veterans while, the same determinants were almost the same for Korean veterans and their counterparts.

5. **Summary of the Past Study Findings**

Although there is no strong consensus on the results of studies that have been done to date, it is useful to classify studies according to their purposes. However, it is necessary to indicate the reasons for disagreement on results in this area. First, naturally, all studies have been done at different times. Second, data sets used varied

among studies. Third, in some cases the same data sets were used, but different methodologies caused different conclusions. Finally, different definitions of "veteran" status might induce dissimilar consequences.

This study classifies the studies in four broad categories as explained below.

a. General Effect of Military on Post-Service Earnings

Higgins [Ref. 8: p. 98], Little and Fredland [Ref. 17: p. 257], and DeTray [Ref. 11: p. 135] found positive effects of military on the subsequent civilian employment. However, these conclusions do not give strong insight to the subject, because when data are disaggregated, some differences appeared among different groups of veterans. On the other hand, retirees do not fare better in their second career. Danzon stated that "weekly wages of retirees are typically 10 to 20 percent lower than those of non-career veterans. Differences vary by race and schooling" [Ref. 16]. Cooper concluded that "the retired military officers earn 25 percent less than comparablely aged and educated non-retired veterans and enlistees earn about 20 percent less than their non-retired peers" [Ref. 15]. However, some studies stressed that the reason for this may be due to military retirees who do not work full time.

b. The Differential Effects of Military Service on Non-Whites and Whites

Supporting the bridging hypothesis Higgins [Ref. 8: p. 52], DeTray [Ref. 11], Martindale and Poston [Ref. 12: p. 229], Lopreato and Poston [Ref. 13: p. 759], and Little and Fredland [Ref. 17: p. 249] found that blacks have advantages of serving in the military. Higgins and Little and Fredland stated that whites also have positive premium to their military service [Refs. 8,17: pp. 52,49]. In general, returns from military service have been positive for blacks but inconclusive for whites.

c. The Effects of Specific Types of Vocational Training Received in the Military

Chamarette and Little and Fredland found positive effects of vocational training accrued in the armed forces [Refs. 5,18: pp. 27,60]. Goldberg and Warner indicated that returns to military training is a function of MOS [Ref. 9]. The effect of general military training is inconclusive. It also varies among war cohorts and races.

d. Earning Differentials for Vietnam Veterans

One of the interest areas in the literature is the earning differences among war cohorts, especially the Vietnam veterans because of their uniqueness. The effect of time in Vietnam-era veterans is very important because the time elapsed since active duty is shorter than the time elapsed since other wars. In 1982 Chamarette found negative returns to Vietnam-era Veterans [Ref. 5: p. 22]. Schwartz concluded that

Vietnam veterans are not worse-off than their non-veteran counterparts, but they have a lower rate of return to their educations [Ref. 10: p. 568]. Reams stated that returns to military service is negative for white Vietnam-era veterans, while the results were inconclusive for blacks [Ref. 6: pp. 81-84]. It may be said that the returns for Vietnam-era veterans are not positive, but not as bad as originally thought.

II. DATABASE, METHODOLOGY AND VARIABLE SELECTION

A. DATABASE

The 1981 National Longitudinal Survey (NLS) of young men is used to perform the statistical analyses. This survey was initiated early in 1965 when the Center for Human Resource Research of The Ohio State University was contracted by the Office of Manpower Policy, Evaluation, and research of U. S. Department of Labor for longitudinal studies of the labor market experience of four groups in U. S. population. These four groups were; men 45 to 59, women 30 to 44, and young men and women 14 to 24 years of age. They are called "men", "women", "boys", and "girls" respectively.

The original survey of young men was initiated with 5,713 boys from 235 sample areas comprising 485 counties and independent cities representing every state and the District of Columbia. However, some members of the initial survey could not be interviewed so that the number of survey members was reduced to 5,225. [Ref. 19: pp. 1-10]

The survey for young men includes many data elements about personal and family characteristics of survey members as well as labor market participation. This collection of data provides the best longitudinal base available to analyze the differences between veterans and non-veterans.

There are some limitations of the National Longitudinal Survey (NLS) of young men for the year 1981. First, since one of the purposes of the NLS survey is to provide separate statistics for minorities, blacks were oversampled. Second, when the data are disaggregated for the analysis of military-related purposes the number of observations gets smaller for each variable. Third, the time of discharge for veterans was not available, and one-term veterans could not be separated from two-term veterans. Higgins found that two-term veterans had higher returns for their time in the military than those of who spent less time in the military [Ref. 8: p. 90].

B. METHODOLOGY

1. Selection of Sample

Since this study deals with Vietnam-era enlisted veterans, it was necessary to eliminate some of the survey members to obtain reasonable results from their earnings equations.

Of the survey members, 1827 did not respond to the survey. The following criteria were applied to the remaining 3398 respondents for the purpose of eliminating them from the subsequent analysis.

a. Officer criterion

Officers were excluded from the survey. It was assumed that officers had different earnings characteristics than both enlistees and civilians. There were 72 officers in the valid survey members. The exclusion of officers reduced the number of survey members to 3326.

b. Fully Employment Criterion

For purposes of this analysis, those individuals working less than 35 hours at their current or last job were eliminated from the data. The inclusion of only full time workers left 2677 valid observations. The rest of this study will be performed based upon these observations.

2. **Analysis**

After determining which individuals should be included in the sample, the first step was the variable selection. Candidate variables were selected based upon human capital theory and a review of the literature.

The second step used the ***chi-square*** statistic or ***t-test*** statistic to determine whether factors possesed by veterans and non-veterans were different from each other within a given race.

The third step consisted of two stages. The first stage performed a ***Chow test*** to identify if subsamples of respondents (e.g. veterans and non-veterans, blacks and non-blacks) could be pooled. The second stage estimated the earnings equations of blacks and whites with a dummy variable for veteran status. A semi-log regression equation was used to perform the analysis.

The fourth step estimated the earnings equations of veterans using race as a dummy variable with the objective of determining the effect of military-specific variables on the earnings of veterans. A semi-log regression equation similar that in the previous stage was used to conduct the analyses.

3. **Model**

Through the analysis, a semilog functional model is used:

$$\ln W_i = \alpha_0 + \beta_0 V + \beta_1 X_1 + \ldots + \beta_n X_n \qquad \text{(eqn 2.1)}$$

where W_i = earnings of individual i

V^1 = veteran status

$X_1 \ldots\ldots X_n$ = variables reflecting individual productivity

$\alpha_0, \beta_0, \ldots \beta_n$ = coefficients to be estimated.

This model has been used in many studies utilizing the human capital theory. Since this is a semi-log function and dependent variable is in logarithms, the coefficients can be approximately interpreted in percentage terms [Ref. 20: p. 38].

C. VARIABLE SELECTION

All of the variables described in this section are derived from the National Longitudinal Survey (NLS) of young men aged 14 to 24 in 1966. Human capital theory and past studies guided the selection of candidate earnings factors[2] as far as the data available. A list of variables used in past studies are presented in Table 3 and Table 4. Table 5 presents the variables used in the most recent studies (since 1982). The following sections describe the variables.

1. The Independent Variables

The independent variables in this study were grouped into five categories following the studies by Chamarette and Thomas, and Reams [Refs. 5,6: pp. 23,44]. These five categories are (1) individual traits, (2) family circumstances, (3) personal characteristics, (4) job environment, and (5) military-specific characteristics.

a. Individual Traits

Individual trait variables are variables that a person is least able to change. In this study age, health status, and race were considered in this category and presented in Table 6.

(1) *Age.* Survey members were 14 to 24 years of age in 1966. The present age of respondents was obtained by simply adding 15 (1981 - 1966) to the age in 1966. The current ages of respondents ranged from 29 to 39 years. Age, generally, determines job experience as well as limiting job opportunities. For the survey members, age is expected to have a positive positive effect on earnings.

(2) *Health Status.* Health is the factor that limits individuals' ability to work. Earnings are expected to be higher for a healthy person than a person with health limitations. A dichotomous variable value of 1 was employed to record affirmative responses and a value of 0 was used to record negative responses. There were 2434 healthy respondents as opposed to 243 limited respondents.

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[2]Earnings factors and dependent variables are identical in this study.

TABLE 3

VARIABLES USED IN PAST STUDIES 1

EXPLANATORY VARIABLES	*Cutright 1972*	*Norrblom 1976*	*Lopreato et al. 1977*	*Martindale et al. 1979*	*Little et al. 1979*	*DeTray 1980*	*Bolin et al. 1980*
Age	X	X	X	X	X	X	X
Education	X	X	X	X	X	X	X
IQ/AFQT	X	X					X
Married or Dependents		X		X			X
Residence-Geographic	X	X	X	X	X	X	
SMSA						X	X
Comparison of Civilian Job		X					
Veteran vs non-veteran	X		X	X	X	X	X
Use of Military Training		X			X		X
Duncan index					X		
Tenure					X	X	X
Experience						X	
Race	X	X	X	X	X		X
Health						X	X
Vocational Training						X	X
EARNINGS MEASURES							
Earnings from Wages and Salaries	X	X	X	X	X		X
Hourly Earnings		X				X	X

(Source: Reams, O. P. , Master's Thesis, Naval Postgraduate School, CA, June 1983.)

TABLE 4

VARIABLES USED IN PAST STUDIES 2

EXPLANATORY VARIABLES	*Hess 1980*	*Bolin 1980*	*F&Little 1980*	*F&Little 1979*	*DeTray 1982*	*Danzon 1980*	*Cooper 1987*
Race	X	X	X	X	X		X
Age	X	X		X	X		X
Education	X	X	X	X	X	X	X
IQ	X	X					
Married	X	X					
Residence	X	X	X	X	X	X	X
SMSA	X	X		X	X	X	
SES	X						
Duncan Index			X	X			
Rotter Scale	X			X			
Vet vs Non-Vet	X	X	X	X	X		
Military Trng		X	X				
Civilian Trng	X	X	X				
Occupation			X			X	
Industry						X	
Tenure		X	X				
Hours Worked						X	
Weeks Worked						X	
Unemployment Rate	X						
Labor Force Part Rate	X						
School Part Rate Part Time	X						
School Part Rate Full Time	X						
Union Membership						X	
Work Ethos				X			
Geographic Mobility				X			
Government Worker				X			
Health		X		X			
Military Base						X	X
EARNINGS MEASURES							
Wages and Salaries		X	X	X		X	X
Hourly Earnings	X	X	X		X		
Earned Annual Income			X				

(Source: Reams, O. P., Master's Thesis, Naval Postgraduate School, CA, June 1983.)

TABLE 5

VARIABLES USED IN MOST RECENT STUDIES

EXPLANATORY VARIABLES	*Chamarette & Thomas*	*Reams*	*Higgins*	*Schwartz*	*Goldberg & Warner*
	1982	*1983*	*1984*	*1986*	*1986*
Age	X	X		X	
Race	X		X	X	X
Vet vs Non-Vet	X	X	X	X	
Months of Training in Military		X			
Tenure	X	X	X	X	
Education	X	X	X	X	X
Marital Status	X	X		X	
Dependents			X		
Health	X				
Collective Bargain		X			
South	X		X		
Residence in Suburb				X	
Hours Worked	X	X			
Military Experience	X				X
Military Experience Squared					X
Work Experience			X		X
Work Experience Squared					X
Branches of Service	X				X
Vocational Training	X				
Weeks Employed	X	X		X	
Time Since Discharge	X				
Method to Learn Job					
On the Job Training		X	X		
# of Employers		X			
SES			X		
Completed Civilian Training			X		
Duncan			X		
Change in Duncan			X		
Rotter			X		
Union			X		
GNPRATE			X		
Change in Unemployment			X		
Age Squared				X	
Central City				X	
West				X	
North Central				X	
Northeast				X	
MOS					X
Retirement Annuity					X
EARNINGS MEASURES					
Annual Wages and salaries	X	X	X	X	X
Hourly wages	X		X		

(3) *Race.* To capture the effect of market discrimination and to reduce the bias in the data, the variable "black" was included in the analysis. Blacks were expected to have lower income than those of non-blacks. A dummy variable value of 1 was assigned to represent black respondents and a value of 0 was utilized to represent non-blacks. Of the survey members 666 were black and 2011 were non-black.

TABLE 6
INDIVIDUAL TRAIT VARIABLES

Variable	*Label*	*Value Coding*
Age	AGE	Continuous
Health status	HEALTH	1 = Health limits work 0 = Otherwise
Race	BLACK	1 = Black 2 = Non-black

b. Family Characteristics

Family characteristic variables describes the family environment of individuals and the parental home environment. Table 7 lists the variables included in this category. Studies including family characteristics have indicated that individuals that belong to higher socio-economic status families have higher earnings. However, the effect of marriage and the number of independents are inconclusive.

TABLE 7
FAMILY CHARACTERISTICS VARIABLES

Variable	*Label*	*Value coding*
Marital status	MRSTA	1 = Married 0 = Otherwise
Number of dependents	DEPND	Discrete

(1) *Marital Status.* A dummy variable with 0 representing married respondents and 1 representing unmarried respondents was utilized to capture the effect of marital status on the earnings equations of survey members. Widowed, divorced, separated and never married were considered as unmarried responses. Married with spouse absent and married with spouse present were included as married respondents. Of the valid respondents, 554 were unmarried while 1851 married. A sizable number of survey members (272) did not respond to the question.

(2) *Number of Dependents.* Responses to the question "Number of dependents excluding wife?" ranged from 0 to 9. This variable was expected to have a positive effect on the earnings of individuals.

c. Job environment

Job environment includes many variables affecting individuals' lifetime earnings. Individuals are able to change some of these variables, depending on national economic conditions and the availability of labor in favor of higher income. A list of job environment-related variables are presented in Table 8.

(1) *Hours worked per week.* Hours worked per week has been found to be closely related to the earnings of individuals in studies utilizing this variable. The question "Usual hours worked at current or last job?" asked the respondents to identify the hours worked per week. Responses ranged from 0 to 168; however, individuals working less than 35 hours per week were eliminated from the data.

(2) *Weeks employed per year.* Naturally, the number of weeks worked during the year had a direct relationship with earnings, and was expected to have a positive effect on earnings.

(3) *Tenure of job.* Tenure was the number of years that a respondent had spent at his current job, and was computed by using the question concerning the month and year that a sample member started working at his current job. This date (month and year) was subtracted from the date of completion of 1981 survey. Tenure is one of the variables that has often been used in past studies to explain the earnings of individuals, and it has consistently been observed to have a positive relationship with earnings.

(4) *Tenure squared.* This variable was employed to account for the diminishing returns that stem from increased time on a job. It was obtained by simply squaring the variable, tenure.

TABLE 8

JOB ENVIRONMENT VARIABLES

Variable	*Label*	*Value coding*
Hours worked per week	HOURS	Continuous
Weeks employed per year	WEKSEMPL	Discrete
Tenure of job	TENUR	Continuous
Tenure squared	TENU2	Continuous
Collective bargaining	UNWAG	1 = Yes 0 = No
Region	SOUTH	1 = Lives in south 0 = Not lives in south
Suburb	SUBRB	1 = Lives in suburb 0 = Not lives in suburb
Rural	RURAL	1 = Lives in rural area 0 = Not lives in rural area
Work experience	WRKEX	Continuous
Work experience squared	WRKE2	Continuous

(5) *Collective bargaining.* One of the factors that affects the earnings of individuals is collective bargaining power. This variable was expected to have a positive effect on the earnings of individuals. In order to capture the effect of bargaining power, the question, "Are wages set by collective bargaining?" was utilized. A dummy variable value of 1 was used for 833 affirmative answers and a value of 0 was used for 1842 negative answers. Of the respondents, two did not know the answer.

(6) *Region.* The variable, region indicated whether the individual lived in south. If he lived in the south he had a value of 1. If not, he had a value of 0. This variable was employed to capture the effect of wage differences between the south and other regions. The number of survey members that live in the south was 1102, and the remaining 1575 respondents were living in other regions of the country.

(7) *Standard Statistical Metropolitan Area (SMSA).* This variable was used to create three different dummy variables representing residence in a centeral city, suburb, and rural area. The variable central city was used as control variable in the equation. The number of the respondents living in suburb were 1078 while the number of the respondents living in the rural areas were 786.

(8) *Work Experience.* Experience is an estimate of the number of years a respondent has spent in the workforce. This variable calculated by subtracting the number of years of education plus five from the respondents age in a given year.

(9) *Experience Squared.* For the same reason as in the "Tenure squared" work experience included in the list of candidate variables and established by squaring the work experience.

d. Personal Characteristics

Although all kinds of training and education can be included in this category only *years of education* was included in this category for two reasons. First, training and education acquired in the military was kept separate from the training gained in civilian life in order to determine the effect of military training on the post-service earnings of veterans. Second, data were not available for the kinds of training gained in civilian life.

One of the most important determinants of the level of earnings is the years of education attained by individuals. It can be as effective either a screening device or as an indicator of productivity of an individual. Education has been significant and had a positive effect on earnings in the studies utilizing it. The variable, years of education, was derived by examining the responses of 1976, 1978, 1980 and 1981 surveys' questions concerning education. The 1976 survey asked for the highest school grade completed to date. Subsequent surveys asked for the increase, if any, in the level of education. It ranged from 0 to 18. Table 9 presents the years of education variable.

TABLE 9
PERSONAL CHARACTERISTICS VARIABLE

Variable	*Label*	*Value coding*
Years of education	EDUC	Discrete

e. Military-Specific Variables

It has been found that factors related to the military service have an effect on post-service earnings of veterans either positively or negatively. Since one of the purposes of this study is to determine the effect of military-related factors on post

service earnings some of the military-related factors were introduced in this category. Table 10 lists the military related variables.

TABLE 10
MILITARY SPECIFIC VARIABLES

Variable	*Label*	*Value coding*
Vietnam-era enlistedman	VVET	1 = Vietnam-era veteran 0 = Not veteran or civilian
Length of service	LNGTH	Continuous
Branch of service	BRNCH	1 = Navy 2 = Army 3 = Air Force 4 = Marine 5 = Coast Guard
Age enlisted	AGEEN	Continuous
#of months training in military	MMNTH	Continuous
Use military training in career	UTRAN	1 = Yes 0 = No
Method of entry into military	ENTRY	1 = Drafted 2 = Enlisted 3 = OCS*ROTC*ACADEMY 4 = Other
Type of training in military	TTYPE	0 = None 1 = Prof*Tech 2 = Managerial 3 = Clerical*Sales 4 = Skilled manual 5 = General education 6 = Military only 7 = OCS 8 = Other
Vietnam-era enlistedman with 18 month LOS	NVVET	1 = Yes 0 = No

(1) *Vietnam-Era Enlisted Veterans.* The Bureau of Labor Statistics and the Veteran Administrative have defined Vietnam-era veterans as persons who served in the armed forces between August 5, 1964 and May 7, 1975. It is a dichotomous variable in this study, 0 represents non-veterans or civilians or veterans who were not in the military during the Vietnam-era, 1 representing Vietnam-era veterans. Of the survey members, 1924 were non-veterans and 753 were veterans.

(2) *Length of Service in the Military.* Length of service (LOS) in the military may effect the veterans' earnings in subsequent civilian job either positively or negatively. A positive effect may occur due to either experience gained in the military or specialization on a specific jobs. A negative impact may appear because of time spent in the military, if the individuals' jobs do not have civilian counterparts. The length of service in the military ranged from 18 months to 104 months after eliminating veterans with less than 18 months of service.

(3) *Branch of Service.* Since each branch of service has different technical levels and lengths of service, it would not be an unrealistic expectation for each branch to have a different effect on the post-service earnings of veterans. To capture the effect of branches of service, three dummy variables were utilized. Those were Marine corps, Navy, and Air Force. The Coast guard was excluded from the analysis due to the small number of observations (There were only 4 coast guard members). The Marine corps was kept as a control variable.

(4) *Age Enlisted in Military.* This variable was used for derivation of time since discharge from the military.

(5) *Number of Months Training in Military.* This variable accounts for the time spent in the military for primary training in addition to "boot camp". The number of months spent in military training was expected to have a positive effect on post-service earnings of veterans for two reasons. First, if the training acquired in the military is applicable to a civilian job, it increases the job opportunities available to the individual. Second, even if the training is not applicable to a civilian job directly, it should enhance the ability of the individual. The number of months training in the military ranged from 0 to 60 months.

(6) *Method of Entry into the Military.* Responses to the question "How did respondents enter armed forces?" were combined with the results of the same question in previous surveys to establish this variable.

(7) *Type of Training in Military.* The variable, type of training in the military, was utilized to cover the effects of different kinds of training acquired in the military on post-service earnings. If the veteran gained training which is applicable to a civilian job, he would probably have higher earnings in the civilian job. Each type of training was employed as an individual dummy variable. Non-taker of the military training was used as a control variable.

(8) *Vietnam-Era Veterans With More Than 17 Months LOS.* Vietnam-era veterans who had served 18 months or more in the military were defined as *veterans* in this study for the same reasons used in Chamarette and Thomas. These reasons were:

- Veterans have a greater period of time to receive additional or advanced training;
- There is a longer indoctrination period for veterans to absorb those desirable work values often attributed to military work experience, and general training;
- It removes members of the Selected Reserves from the sample. These members did only six months full-time services and would not have suffered the disruption of typical military service on employment, or received advanced training;
- It removes from the "veteran sample" those personnel who are actually unsatisfactory for military service. Most early attrition or discharges within the first two years are due to psychological and physiological deficiencies, fraudulent enlistment, or criminal activities;
- There is a better assessment as to the possible effects of the draft. Traditionally, the two year draft period has been considered one that is economically viable to the services with regard to returns on training. [Ref. 5: pp. 9-10]

However, the minimum length of service criterion applied is 18 months in this thesis instead of 24 months for two reasons: (1) the differences between 18 months and 24 months of service is minimal with respect to the returns to veteran status. Higgins proved that there is only two in a thousand difference between the two kinds of criteria, (2) a limit of 24 months would have left fewer observations [Ref. 8: p. 79]. Of the survey members, 621 were Vietnam-era enlisted with 18 months or more service and 2065 were not Vietnam-era enlisted veteran or civilian.

2. **The Dependent Variables**

Hourly rate of pay and ***Annual wages and salaries*** were selected as earnings measures[3]. Table 11 presents the earnings measures. In the section below, earnings measures are explained.

a. Hourly Rate of Pay

Members were asked "Hourly rate of pay at current or last job". Answers to the question ranged from $0.25 per hour to $275 per hour. However, these answers were questionable because personnel working less than 35 hours were already eliminated from the data. On the other hand, minimum wage was $2.35 per hour in

[3]The dependent variable and the earnings measure are the same.

TABLE 11
EARNINGS MEASURES

Variable	*Label*	*Value coding*
Hourly rate of pay	LWAGE	Continuous
Annual wage and salary	LEARN	Continuous

1981. In order to correct this conflict, $2.50 was used as the cut-off value and hourly wages less than $2.50 were considered as missing cases.

b. Annual Wage and Salary

The second variable employed to measure earnings of survey members was the annual wages and salaries of survey members. It is derived from the question "Income from wages and salary in past year?". The minimum value was $5,000 and maximum $50,001. This result was obtained after eliminating abnormally low wages and salaries. As explained in preceding section, $2.35 was the minimum wage in 1981 and $2.50 was used as the cut-off value. The annual income of respondents was divided by 52 multiplied by hours worked. If the result was less than $2.50, responses to the question were considered as missing.

III. DISTRIBUTION OF EARNINGS FACTORS

The purpose of this chapter is to determine whether the earnings factors are distributed equally between Vietnam-era enlistees and their civilian counterparts for a given race in the year 1981. It is obvious that if earnings factors possesed by veterans and non-veterans are the same, differences in earnings may be attributable, mostly, to veteran status. However, if there are some significant differences between two groups with respect to earnings factors, the veteran status will be one of the factors that effect post-service earnings of veterans and its effect should be evaluated with the other variables.

The equality of factors were analyzed by using chi-square tests and t-tests. The following sections will explain these two tests and present the results. The tests were conducted by using the SPSS^X software package.

A. CHI-SQUARE TEST

Equality of dichotomous variables were tested by utilizing a chi-square test. A chi-square test is useful for determining whether there is any difference in the distribution of variables in two different groups [Ref. 21: p. 396].

It was hypothesized that the proportion of earnings factors are the same for both veterans and non-veterans within a given race. If the hypothesis is true, it can be concluded that there is no evidence of difference between the distribution of the variable in the two groups. Each dichotomous variable was paired with the variable, Vietnam-era enlisted veteran with LOS more than 17 months in the contingency tables and is presented in Appendices A through F along with the chi-square, degrees of freedom, significance level, and column and row percentages. Table 11 and Table 12 show the summary results for blacks and non-blacks, respectively.[4]

B. T-TEST

The second method used to test the equality of earnings factors for veterans and non-veterans was the t-test. This test is utilized for continuous variables and discrete variables. The t-test performs the analysis based on the difference between the sample

[4]Table 12 and Table 13 present the results in terms of means of variables. To give a clearer perspective, descriptive statistics of the four groups are presented in Appendices I through L.

means. Because the statistics will follow a normal distribution according to the central limit theorem, the results can be applied to the populations. The results of the t-tests are represented in Appendices G and H for blacks and non-blacks, respectively.

C. RESULT OF EARNINGS FACTORS

Results indicated that there are some significant differences between the earnings factors of veterans and non-veterans for 1981 panel of NLS survey. That is, it can be concluded that differences between the incomes of the two groups is not only attributable to veteran status but is also influenced by other earnings factors. The summary of the test results are presented in Table 11 and Table 12 for non-blacks and blacks, respectively.

1. Non-blacks

The most important difference appeared between annual earnings of veterans and non-veterans. Non-black veterans earn $1249 less than non-black non-veterans, and the difference is significant at .05 level. Non-black veterans have earnings factor advantages over non-veterans with regard to marital status, residence in south, and residence in rural area. Non-veterans have earnings factor advantages over veterans with respect to tenure of job, number of dependents and hours worked per week. Age, years of education, health, unionization, residence in suburb, hourly wages, work experience, and weeks employed during the year appeared to be statistically insignificant.

2. Blacks

On the average, black veterans earn $2,391 more than black non-veterans, and it is significant at .01 level. Age, unionization, residence in rural areas, and hourly wages were statistically different for black veterans from non-veterans. On the other, hand black non-veterans have earnings factor advantages over veterans with regard to the number of dependents and work experience. Tenure of job, marital status, health limitations, residence in suburb, hours worked per week, and weeks employed during the year did not appear to be different for black non-veterans and black veterans.

In general, black veterans have earnings factor advantages over non-veterans, while the reverse is true for non-black veterans. These results are consistent with previous studies and can be interpreted in two different ways. First, blacks benefit from serving in the military while whites having earnings disadvantages for serving in the military. That is, the military provides blacks with a "bridging environment". Second, the military recruits only persons that possess certain qualifications, and had

they not served in the military they would have had the same amount of earnings. The comparison of earnings factors of four groups (Table 11 and Table 12) suggests that the difference is rather high between non-black non-veterans and black non-veterans while the difference is not that high between non-black veterans and black veterans.

TABLE 12

SUMMARY OF EARNINGS FACTOR TEST RESULTS
NON-BLACKS

VARIABLE	NON-VETERAN	VETERAN
AGE	33.17	32.99
TENUR	6.67	5.93***
EDUC	13.80	13.62
MRSTA	0.80	0.84*
DPND	1.68	1.56*
HLTH	0.10	0.08
UNWAGE	0.29	0.32
SOUTH	0.32	0.27
RURAL	0.29	0.25*
SUBRB	0.47	0.48
HOURS	44.88	43.40***
WRKEX	14.37	14.37
WEKSEMPL	51.58	51.40*
HWAGE	$10.69	$10.61
EARN	$23,153	$21,904**

*** Significant at .01 level

** Significant at .05 level

* Significant at .10 level

TABLE 13

SUMMARY OF EARNINGS FACTOR TEST RESULTS
BLACKS

VARIABLE	NON-VETERAN	VETERAN
AGE	32.90	32.39*
TENUR	6.55	5.85
EDUC	11.76	13.05***
MRSTA	0.63	0.66
DPND	2.07	1.68**
HLTH	0.09	0.06
UNWAGE	0.33	0.42*
SOUTH	0.72	0.68
RURAL	0.36	0.23***
SUBRB	0.19	0.22
HOURS	43.26	42.80
WRKEX	16.14	14.34***
WEKSEMPL	50.88	51.15
HWAGE	$7.09	$7.92***
EARN	$15,311	$17,482***

*** Significant at .01 level

** Significant at .05 level

* Significant at .10 level

IV. CHOW TEST AND THE EARNINGS EQUATIONS

This chapter determines the earnings equations of survey members and interprets the results. Since data contained different groups, a Chow test was needed to determine whether the the earnings equations of blacks and non-blacks, veterans and non-veterans could be estimated using the same model. The following section explains the application of the Chow test and presents its results. The final section estimates the earnings equations for survey respondents.

A. CHOW TEST

1. Definition

A Chow test was computed to determine the applicability of a single model for both black and non-blacks and for both veteran and non-veteran earnings equations. The Chow test assumes that the coefficients of two identical regression models are equal and then tests to prove whether this null hypothesis is correct. The appropriate test statistic is:

$$F_{k,N+M-2k} = \frac{(ESS_R - ESS_{UR}) / k}{ESS_{UR} / (N + M - 2k)} \qquad \text{(eqn 4.1)}$$

where:

k = the number of variables

N = the number of observations for first group (veterans or blacks)

M = the number of observations for second group (non-veterans or non-blacks)

ESS_R = the Error Sum of Squares from an Ordinary Least Squares (OLS) regression on the total (black or veteran and non-black or non-veterans) sample.

ESS_{UR} = the sum of Error Sum of Squares from individual black or veteran and non-veteran or non-black regressions.

If the F-statistic is greater than the critical value of the F distribution with k and N + M - 2k degrees of freedom the null hypothesis is rejected [Ref. 22: p. 123,124].

2. **Performance**

Table 14 shows the results of the Chow test. Results were obtained by a semi-logarithmic earnings equation described in Chapter II.

Although the annual income from wages and salaries is the most common dependent variable, hourly wage rate was used as the dependent variable in the test. As it was explained by Fredland and Little, hourly wage rate is a better measure of earnings because it compensates for differences in the amounts individuals earn for each hour worked which might not be reflected in a gross annual income figure [Ref. 18: p. 53].

In this case, the null hypothesis was rejected for blacks and non-blacks, necessitating separate earnings equations for blacks and non-blacks. In other words, data for blacks and non-blacks should not be pooled together. On the other hand, the decision rule was to not reject the null hypothesis for veterans and non-veterans. That is, earnings equations for veterans and non-veterans can be estimated by the same model, or their data can be pooled.

TABLE 14
CHOW TEST RESULTS

	ESS	N	k	Decision
Blacks equation equation	59.750	541	12	
Non-blacks equation	246.265	1743	12	
Pooled	330.294	2284	24	Reject null hypothesis
Veterans equation	64.683	521	12	
Non-veterans equation	263.697	1763	12	
Pooled	330.294	2296	24	Do not reject null hypothesis

This result conflicts with the conclusions made by Schwartz in his study. However, he utilized a different data set with the dependent variable, annual income,

and concluded that the coefficients of the earnings factors are all the same for Vietnam veterans and comparable non-veterans. [Ref. 10: p. 571]

B. EARNINGS EQUATIONS BY RACE

To test the hypothesis that being in the service has no different impact from being in the civilian labor force on the later earnings of the individuals, two regression models were constructed: one for blacks and one for non-blacks in accordance with the preceding section. The following subsections present and interpret the results.

1. Earnings Equations of Blacks

The model used for blacks was capable of explaining 45 percent of the variation in the hourly rate of pay and was significant at .01 level. The variable "number of dependents" was excluded from the equation. Exclusion of this variable did not cause R^2 to decrease significantly. On the other hand, the adjusted R^2 did increase. Another variable deleted was "the hours worked per week". This variable was deleted because it was already included in the dependent variable (pay hours worked = hourly pay).

The remaining 12 independent variables were kept in the equation. Table 15 displays results of the wage equation for blacks. None of the independent variables were highly correlated with each other, with the exception of tenure and and tenure squared. Correlation coefficients for the earnings factors of blacks are shown in Table 16.

Two of the independent variables were insignificant: veteran status and age. Veteran status had a positive 2.7 percent return. That is, the average black veteran would have a gain of $.20 in hourly pay over nonveterans.[5] Although these results are not comparable with most of the other studies due to the use of different models, similar results on the hourly wage were found by DeTray when he utilized a model that was similar to the one used in this thesis [Ref. 11: p. 136]. Another insignificant variable was age with less than one percent return. The same result was found by Chamarette and Thomas and Reams [Refs. 5,6: pp. 22,81].

All other variables were found to be significant. The most important variable was unionization. Unionized members had a 25.5 percent return over the non-unionized members which is equivalent to $1.78 per hour. Workers in rural areas and the suburbs would have earnings losses of $1.19 and $.68 per hour as opposed to city

[5]Returns to earning factors were calculated by multiplying coefficient of earnings factors by the mean of hourly wage. Mean values of earnings factors are presented in Appendix M along with the other descriptive statistics.

TABLE 15

RESULTS OF ESTIMATING WAGE EQUATION
BLACKS

VARIABLE	B	BETA	T	SIG T
UNWAG	.245	.264	7.52	.01
EDUC	.041	.252	7.16	.01
RURAL	-.164	-.177	-4.55	.01
TENUR	.044	.480	4.44	.01
MRSTA	.102	.111	3.32	.01
WEKSEMPL	.010	.111	3.41	.01
TENU2	-.002	-.334	-3.07	.01
SOUTH	-.107	-.108	-2.95	.01
SUBRB	.094	.083	2.41	.02
HLTH	-.116	-.070	-2.14	.03
NVVET	.027	.025	.75	.45
AGE	.007	.048	1.42	.16
CONSTANT	.522		2.36	.02

$R^2 = .45$

F statistics = 36.83 Significance = .01

workers. Individuals living in the South had $.84 negative premium. People who had health problems suffered an earnings loss of $.84, on the average. For each additional year on the last job and for each additional year of schooling, individuals earned a premium of $.30 and $.31 respectively. Married people earned 10 percent more than non-married people which translates into $.73 per hour, on the average. The variable, tenure squared had a negative impact on earnings as expected, but the impact was very low (two in thousand). The number of weeks worked in the year prior to the survey had a one percent positive return.[6]

[6]The importance of variables were evaluated by coefficient of determination That is, after statistical adjustment for the other independent variables. On the other

TABLE 16
CORRELATION COEFFICIENTS OF REGRESSION EQUATION
BLACKS

	AGE	TENUR	EDUC	MRSTA	HLTH	UNWAG	SOUTH	RURAL	TENU2	WEKSEMPL	SUBRB	NVVET
TENUR	.207											
EDUC	-.102	.019										
MRSTA	.110	.144	.073									
HLTH	.114	-.001	-.091	-.102								
UNWAG	.007	.217	.087	.090	-.021							
SOUTH	-.010	-.061	-.153	-.018	-.022	-.314						
RURAL	.010	-.030	-.323	.083	-.024	-.218	-.425					
TENU2	.255	.952	-.022	.115	.014	.179	-.068	-.024				
WEKSEMPL	.038	.099	.077	.112	.009	-.025	.064	-.002	.097			
SUBRB	.001	.053	.225	.041	.053	.067	-.167	-.354	.048	.067		
NVVET	-.075	-.054	.188	.020	-.047	.114	-.061	-.116	-.091	.059	.034	
LWAGE	.044	.276	.406	.196	-.098	.420	-.316	-.390	.213	.153	.257	.144

2. **Results of Non-Black Earnings Equation**

Unlike in the black earnings equation, when annual income from wages and salaries was included as dependent variable a higher R^2 was obtained. For this reason, annual income from wages and salaries was employed in the non-black earnings equation.

The earnings equation of non-blacks was significant at .01 level and was able to explain .33 percent of variation in annual income from wages and salaries. Table 17 shows the results of the annual earnings equation for non-blacks. Correlation coefficients are presented in Table 18. Appendix N presents the descriptive statistics of the earnings factors used in the equation.

Of the independent variables detailed in Chapter II, the variable, number of dependents and residence in suburb were removed from the equation. The first one was highly correlated with the variable marital status (r=.46). Since the individual explanatory power of variable, marital status, was higher than that of the number of dependents, marital status was kept in the equation(r=.15 vs r=.13). A second variable, suburb was removed from the equation. Suburb was highly correlated with the variable, rural (r=.60). For the same reason explained above, rural was included in the equation rather than suburb (-.240 vs .211). The exclusion of these two independent variables did not change the R^2 or the t-values significantly.

Two of the remaining 12 independent variables were insignificant. The first one was veteran status. Unlike the earnings equation for blacks, veteran status had a negative effect on the annual income of non-blacks. Non-white veteran would earn $206 less than their civilian counterparts when annual income is measured by wage and salaries in a given year. This finding is consistent with that of Chamarette and Thomas and Reams. The other insignificant variable was unionization, with a $306 earnings premium.

The most influential variable was living in a rural area with a negative 21 percent return. This finding indicates that workers in the rural area made $4800 less in a year when compared to workers in the city. Married non-blacks earned approximately $4344 more than non-blacks non-married people. People with health

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hand, if variables were evaluated with their explanatory power alone the results would be different. Because in that case, correlation coefficients will be determinants of explanatory power of earnings factors. For example, years of schooling would be the second important variable in explaining the variation in hourly wage with a correlation coefficient of .406.

TABLE 17

RESULTS OF ESTIMATING ANNUAL EARNINGS EQUATION NON-BLACKS

VARIABLE	B	BETA	T	SIG T
EDUC	.054	.301	14.17	.01
TENUR	.035	.397	5.81	.01
RURAL	-.207	-.206	-10.01	.01
HOURS	.011	.188	9.18	.01
MRSTA	.186	.158	7.70	.01
AGE	.025	.175	7.78	.01
WEKSEMPL	.026	.124	6.11	.01
HLTH	-.182	-.113	-5.62	.01
TENU2	-.001	-.218	-3.10	.01
SOUTH	-.041	-.041	-1.98	.05
NVVET	-.009	-.089	-.44	.66
UNWAG	.016	.016	.74	.46
CONSTANT	6.320		25.41	.01

$R^2 = .33$

F statistics = 68.33 Significance = .01

limitations suffered from a $4155 earnings loss. The return for one more year of education was about $1143. Employees in the South earned $914 less than the employees working in other parts of the country. Tenure on the last job and the number of weeks worked in the survey year also had positive returns to annual income of $686 and $572, respectively. Tenure squared had a negative $229 impact on annual earnings.

These results are consistent with Chamarette and Thomas and Reams, although the results are not strictly comparable because of the different date of studies and differences in the models. [Refs. 5,6,11: pp. 22,84,137]

TABLE 18

CORRELATION COEFFICIENTS OF REGRESSION EQUATION NON-BLACKS

	AGE	TENUR	EDUC	MRSTA	HLTH	UNWAG	SOUTH	RURAL	HOURS	TENU2	WEKSEMPL	NVVET
TENUR	.323											
EDUC	.001	-.097										
MRSTA	.122	.050	-.092									
HLTH	.045	-.029	-.068	-.028								
UNWAG	-.052	.147	-.184	.030	-.021							
SOUTH	-.036	.011	-.118	-.002	.012	-.195						
RURAL	.043	-.003	-.149	.123	.031	-.063	.111					
HOURS	.026	-.108	.053	.005	.004	-.156	.044	.042				
TENU2	.389	.953	-.123	.049	-.014	.123	.013	.003	-.087			
WEKSEMPL	.016	.061	.068	.014	.018	-.061	.023	-.057	-.008	.059		
NVVET	-.041	.060	-.046	.030	-.026	.042	-.054	-.033	-.092	-.087	.012	
LEARN	.232	.218	.335	.141	-.142	-.031	-.097	-.234	.172	.194	.167	-.033

3. A Summary of Earnings Equations

Despite the differences in the models employed for blacks and non-blacks there are some common characteristics of the two models;

- Equations both for blacks and non-blacks were significant at .01 level
- The variable, veteran status, was insignificant in both equations: However, it was positive in sign for blacks and negative in sign for for non-blacks.
- Unionization , living in a rural area, the South and marital status seemed to be the most effective earnings factors for blacks. For non-blacks living in a rural area, marital status, and health were the most influential earnings factors.

V. EARNINGS EQUATIONS OF VETERANS

The purpose of this chapter is to estimate wage equations and annual earnings equations for veterans with the objective of determining the effect of military-specific variables on post-service earnings. In accordance with results of Chow test, the subsequent earnings of black veterans and non-black veterans were estimated separately. The wage equations and annual earnings equation were tested on identical models so that direct comparison can be made within each race and between the two races.

Some of the military-specific variables detailed in Chapter II were not utilized in the analysis. The first variable removed from the analysis was "type of training in the military". When each type of training is used as a dummy variable, the number of observations in each category of training was very small except for non-taker of military training, takers of managerial training, and takers of skilled training. The second variable deleted was "method of entry into the military". Not surprisingly, many of the Vietnam-era enlisted veterans entered the service by being drafted. There were 203 draftees and 385 enlistees included in the survey. The number of observations for other methods of entering the military was very low (3 for OCS, ROTC and Academy and 10 for others). Furthermore, it would not be unrealistic to assume that some of the enlisted Vietnam-era veterans were actually draft-induced volunteers. Since it is not possible to distinguish draft-induced volunteers from true volunteers, the variable "method of entry into the military" was excluded from the analysis.

In addition to military-specific variables, five control variables were included in the equations in an attempt to measure the explanatory power of these factors on post-service earnings of veterans. Those earnings factors are age of veteran, the years of education, tenure on the last job, the number of weeks worked prior to survey, and the region that veteran lives. Since the same variables were used in all equations, the comparison of returns to above factors will be available.

A. RESULTS OF ANNUAL EARNINGS EQUATIONS FOR VETERANS BY RACE

The model used was capable of explaining 25 percent of the variation in annual income of black veterans and 19 percent of the variation in annual income of non-

black veterans. Both equations are significant at the .05 and .01 level, respectively. None of the variables are highly correlated with each other. Table 19 displays the results of the annual earnings equations for blacks and non-blacks. Correlation coefficients are shown in Tables 20 and 21.

TABLE 19
RESULTS OF ANNUAL EARNINGS EQUATIONS FOR VETERANS BY RACE

	BLACKS VETERANS		NON-BLACKS VETERANS	
VARIABLE	B	SIG T	B	SIG T
EDUC	.078	.01	.035	.01
TENUR	.027	.02	.023	.01
SOUTH	-.195	.03	-.052	.25
UTRAN	-.243	.07	-.006	.89
NAVY	-.013	.93	-.010	.09
MMNTH	.001	.81	-.001	.87
WEKSEMPL	.010	.80	.034	.01
MARIN	.036	.83	.048	.52
LNGTH	.003	.29	-.001	.61
AGE	-.018	.28	.016	.04
AIRFC	-.108	.39	.117	.08
CONSTANT	8.680	.01	7.400	.01
R^2	.25		.19	
F-statistics	2.35		7.04	
Significance	.02		.01	
N	89.00		341.00	

TABLE 20

CORRELATION COEFFICIENTS OF ANNUAL EARNINGS
EQUATION OF BLACK VETERANS

	AGE	TENUR	EDUC	MARIN	UTRAN	SOUTH	MMNTH	LNGTH	WEKSEMPL	AIRFC	NAVY
TENUR	-.255										
EDUC	.141	-.013									
MARIN	-.193	-.011	-.057								
UTRAN	.198	-.056	.136	-.103							
SOUTH	-.103	.056	-.032	.097	.003						
MMNTH	-.166	-.100	-.072	.291	.011	.098					
LNGTH	-.132	-.079	-.019	.065	.322	.063	.125				
WEKSEMPL	-.067	.143	.081	.034	.050	-.090	-.002	.086			
AIRFC	-.037	.001	.383	-.135	.293	.063	.091	.391	.063		
NAVY	-.030	.009	-.037	-.079	.007	.032	-.035	-.020	.037	-.147	
LEARN	-.043	.207	.286	.053	-.186	-.210	-.019	-.003	.115	.015	-.014

TABLE 21

CORRELATION COEFFICIENTS OF ANNUAL EARNINGS EQUATION FOR NON-BLACK VETERANS

	AGE	TENUR	EDUC	MARIN	UTRAN	SOUTH	MMNTH	LNGTH	WEKSEMPL	AIRFC	NAVY
TENUR	.349										
EDUC	.101	-.114									
MARIN	-.082	-.022	-.032								
UTRAN	.000	-.014	-.035	.023							
SOUTH	-.055	-.132	-.042	-.091	.042						
MMNTH	.134	.000	-.028	-.037	.109	-.059					
LNGTH	.065	-.061	.000	.063	.093	.046	.310				
WEKSEMPL	.072	.097	.008	-.067	-.050	.050	.019	-.056			
AIRFC	-.043	.074	-.008	-.138	.072	.024	.022	.417	.033		
NAVY	.089	-.136	.004	-.158	.032	.025	.295	.311	-.088	-.234	
LEARN	.235	.297	.164	-.028	-.014	-.096	.029	.022	.223	.086	-.016

The results of the control variables are consistent with other works. The years of schooling is found to be one of the most influential variables in both equations. Black veterans have an eight percent return to their annual income for each additional year of schooling while non-black veterans have a four percent return. Returns to annual income from one more year of tenure on the last job are almost the same for black veterans and non-black veterans. Living in the South has a negative 20 percent return on annual incomes of black veterans compared to 5 percent returns on annual earnings of non-black veterans. But, the result is insignificant for non-black veterans. This result can also be interpreted as non-black veterans that are working in the South have an earnings loss of $1139 compared to non-black veterans that are working in areas other than south. On the other hand, black veterans living in the South have an income loss of $3497 as opposed to black veterans out of South. The number of weeks worked during the year prior to survey effected the annual incomes of both groups positively. The non-black veterans have a three percent return to their each additional week worked. On the other hand, black veterans have one percent return, and this is insignificant. The effect of age is different for each group. The non-black veterans have an almost positive two percent return to their one more year of age. Conversely, the black veterans have a negative two percent return to their one more year of age and this result is also insignificant.

Of the military-specific variables, only the variable "user of military training" is significant at the 10 percent level for black veterans. The earnings losses accruing to users of military training are 24 percent and one percent for black veterans and non-black veterans, respectively. These results translate into a $4196 earnings loss for black veterans that use military training in civilian jobs as opposed to black veterans that do not use military training in civilian jobs, and a $131 earnings loss for non-black veterans of user of military training as opposed to non-black veterans of non-user of military training.

There are significant differences between the two groups with respect to returns to branch of service. The differences are not only in magnitude but also in significance levels and signs. Having served in the Navy has a one percent negative impact on post-service annual earnings of both black veterans and non-black veterans. However, while the results were significant at the 10 percent level for non-black veterans, they were insignificant for black veterans. A black veteran that served in the Navy made less than a black veteran that served in the Army. The loss for having served in the

Navy is $219 for non-black veterans. The influence of having served in the Marine Corps is positive for both black veterans and non-black veterans on post-service annual earnings. The return for a black veteran is an insignificant four percent and translates into approximately $700, and five percent for non-black veterans, which is equivalent to $1095. The effect of having served in the Air Force is considerably different for each group. The black veterans in the Air Force had an 11 percent ($1888) decrease in earnings when compared to black veterans in the Army; however, this result was insignificant. On the other hand, non-black veterans have an earnings premium of $2563, (12 percent) over the non-black veterans that served in the Army.

Returns from "time spent in military training" and "length of service" are positive for black veterans and insignificant, but the effects are very small (.001 and .003, respectively). As with the black veterans, "time spent in military training" and "length of service" have very small and insignificant influence on post-service earnings of non-black veterans. However, these results were negative in sign with coefficients of -.001 and -.001, respectively.

B. RESULTS OF THE WAGE EQUATIONS FOR VETERANS BY RACE

The similar model and the same variables used in the annual earnings equations were employed to estimate wage equations of black veterans and non-black veterans with the objective of comparison of results of wage equations with annual income equations. The wage equations are significant at the .01 level. The wage equation explains 35 percent of the variation in hourly wage of black veterans while the same equation is able to explain 14 percent of the variation in hourly wage of non-black veterans. Results of the wage equations are presented in Table 22. Table 23 and 24 display the correlation coefficients for the variables for black veterans and non-black veterans, respectively.

As in the annual income equations, tenure on the last job and education have a positive effect on hourly wage, which is significant at the .01 level. In percentage terms, returns to hourly wage and annual income from one more year of tenure and one more year of education are almost the same. The black veterans, on the average, have approximately eight percent earnings premium from one year of schooling. These results suggest that black veterans have higher returns to their education than non-black veterans. Returns from one more year of tenure on the last job are four percent for black veterans and two percent for non-black veterans. These results are very close

TABLE 22

RESULTS OF WAGE EQUATIONS FOR VETERANS BY RACE

	BLACKS VETERANS		NON-BLACKS VETERANS	
VARIABLE	**B**	**SIG T**	**B**	**SIG T**
EDUC	.078	.01	.042	.01
TENUR	.038	.01	.019	.01
SOUTH	-.113	.14	-.090	.05
UTRAN	-.170	.14	-.007	.89
NAVY	-.241	.08	.110	.07
MMNTH	.003	.58	-.002	.49
WEKSEMPL	.054	.13	.001	.77
MARIN	-.188	.20	.058	.44
LNGTH	.003	.20	-.003	.19
AGE	-.011	.49	.015	.06
AIRFC	-.088	.42	.118	.08
CONSTANT	-1.680	.38	1.100	.01
R^2	.35		.14	
F-statistics	4.32		5.18	
Significance	.01		.01	
N	98.00		364.00	

to those obtained from annual income equations. As with the annual earnings equations, residents of the South suffered from a loss of 11 percent and nine percent in their hourly wage. However, contrary to annual earnings equation, the result is significant for non-black veterans and is insignificant for black veterans. The loss for black veterans is 5.89 as opposed to those living outside of the South. The loss for

TABLE 23
CORRELATION COEFFICIENTS OF WAGE EQUATION OF BLACK VETERANS

	AGE	TENUR	EDUC	MARIN	UTRAN	SOUTH	MMNTH	LNGTH	WEKSEMPL	AIRFC	NAVY
TENUR	.366										
EDUC	.134	-.023									
MARIN	-.200	-.087	-.058								
UTRAN	.224	-.031	.103	-.117							
SOUTH	-.107	-.001	.038	.134	.024						
MMNTH	-.161	-.123	-.079	.420	.000	.151					
LNGTH	-.061	-.020	-.021	.073	.330	.096	.130				
WEKSEMPL	-.079	.115	.077	.036	.047	-.085	.002	.078			
AIRFC	.007	.029	.358	-.146	.265	.076	.078	.385	.059		
NAVY	-.074	.007	-.077	-.083	.008	.030	-.082	-.042	.033	-.136	
LWAGE	.112	.365	.338	-.109	-.097	-.136	-.063	.038	.217	.115	-.166

TABLE 24

CORRELATION COEFFICIENTS OF WAGE EQUATION OF NON-BLACK VETERANS

	AGE	TENUR	EDUC	MARIN	UTRAN	SOUTH	MMNTH	LNGTH	WEKSEMPL	AIRFC	NAVY
TENUR	.345										
EDUC	.095	-.094									
MARIN	-.090	-.046	-.061								
UTRAN	.010	.032	-.038	.005							
SOUTH	-.050	-.124	-.034	-.071	.012						
MMNTH	.129	.018	-.035	-.038	.129	-.046					
LNGTH	.043	-.054	.024	.073	.087	.024	.292				
WEKSEMPL	.024	.110	.075	-.191	.017	-.030	.051	-.025			
AIRFC	-.058	.077	.000	-.140	.067	.017	.035	.406	.053		
NAVY	.088	-.117	.010	-.162	.022	.022	.268	.308	-.001	-.228	
LWAGE	.193	.241	.203	-.024	-.010	-.139	-.015	-.018	.058	.053	.027

nine percent is equal to $.95 for non-veterans. It can be concluded that living in the South presents a disadvantage for both black and non-black veterans, but this disadvantage is higher for black veterans than those of non-black veterans.

The effect of number of weeks employed in a year prior to survey is not significant neither for black veterans nor for non-black veterans. But it was significant for non-black veterans in annual income equation.

The effect of the variable "age" is similar to those of obtained from annual earnings equations. The loss from one more year of age is one percent for black veterans. On the other hand, non-black veterans have an earnings premium of two percent to their hourly wages and this is significant. It can be generalized, for 1981 survey of NLS, that the black veterans have earnings loss from getting older while the non-black veterans have earnings advantages from getting older. Users of military training suffer from a loss in their hourly wages (-.17 or $1.34 for black veterans and -.007 or $.07 for non-black veterans) as in annual income. But, in the case of wage equation none of the results are significant. Taken together for annual earnings equations and wage equations, the loss for users of military training is higher for black veterans than those of non-black veterans.

Having served in the Navy has negative returns to hourly wages of both black veterans and non-black veterans as in the annual income equation;. however, the results are significant for both groups. The black veterans who served in the Navy have 24 percent earnings loss which is equivalent to $1.91 per hour compared to those who served in the Army. The result for non-black veterans is a loss of 11 percent or approximately $1.17 compared to Army veterans. The conclusion which can be drawn from these results is that having served in the Navy has negative returns to earnings of both black and non-black veterans, and the loss is higher for black veterans.

Having served in the Marine Corps has a negative 19 percent or $1.50 return to hourly wage of black veterans. For non-black veterans the result is positive and has a value of six percent or $.61. However, results are insignificant.

Serving in the Air Force has a negative nine percent or $.70 effect on hourly wage of black veterans and a 12 percent or $1.30 significant positive effect on hourly wage of non-black veterans. These results, in percentage terms, are very similar to those for annual wage equation. The conclusion that can be reached from these results is that the non-black veterans benefit from having served in the Air Force while the black veterans suffer from an earnings loss for serving in the Air Force.

Like in the annual earnings equations, "time spent in the military training" and "length of service" have very small influence on wage rates of both black and non-black veterans. Results are positive in sign for black veterans and negative in sign for non-black veterans, and all of them are insignificant.

C. SUMMARY OF EARNINGS EQUATIONS

This chapter estimated the annual earnings equations and wage equations of veterans by race. By doing so, it was possible to compare the annual earnings equations or wage equations of veterans with each other (i. e. between the two races). Additionally, the magnitude and sign of returns to annual income and hourly wages from the same earnings factors would give more insight on the effect of the earnings factors. All equations are significant at .01 level except the annual earnings equations for blacks (It is significant at the .05 level). However, the value of the F-statistics are quite low.

Although the same model and same independent variables were used, higher R^2 was obtained from the annual earnings equations of non-black veterans than the wage equations. On the other hand, a higher R^2 was obtained for the wage equation of black veterans than for the annual earnings equation of black veterans.

Years of schooling and tenure on the last job appeared to be significant in all equations. Living in the South has an adverse effect on earnings; however, the significance level is changed by race and by dependent variable. The effect of older age is negative and insignificant for black veterans in both equations, while it is positive and significant for non-black veterans in both equations. The effect of weeks worked is small and inconclusive.

The time spent in the military and length of service do not have a significant effect on either hourly wage or annual income. Branches of service have different impact on earnings, and results from the wage equations and annual earnings equations are consistent with each other, although there are some differences in the significance levels.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

There are a number of conclusions to be drawn from this study based on the analyses conducted. The first is that there are some significant differences between the earnings factors of veterans and non-veterans. This finding suggests that the difference between post-service earnings of veterans and non-veterans is not only attributable to the veteran status but also to the differences of other earnings factors. Thes result supports the findings of Chamarette and Thomas, and Reams [Refs. 5,6: p. 12,pp. 73,74].

The second major conclusion to be drawn is that when the hourly rate of pay employed as an earnings measure with a semi-logarithmic function in estimating the effect of earnings factors, the data could not be pooled for blacks and non-blacks. On the other hand, the data could be pooled for veterans and non-veterans.

The third conclusion is that the effect of of the veteran status is inconclusive for both blacks and non-blacks. This finding is consistent with the conclusion of Chamarette and Thomas [Ref. 5: p. 22], in some cases, of Detray [Ref. 11: p. 136], but conflicts with the conclusions of Little and Fredland [Ref. 17: p. 257].

Another conclusion that can be drawn is that black veterans have higher returns for each additional year of schooling than do non-black veterans when income is measured either in hourly wage or in annual income from wages and salaries.

The final conclusion to be drawn from this paper is that the effect of time spent in military training, and length of military service on the later earnings of veterans are inconclusive. This finding is consistent when income is measured in both hourly wage and annual income from wage and salaries. Additionally, users of military training suffer from an earnings loss. This result is also inconclusive except for black veterans when income is measured in terms of annual income. In every case the effect is negative. Although this result does not apply to all veterans, it can be concluded that training given to Vietnam-era enlisted veterans does not contribute to the post-service earnings of veterans. Looked at another way, the loss accrued to the military because of separation, cannot be compensated by a corresponding gain to the society.

B. RECOMMENDATIONS

The post service earnings of veterans requires further investigation, especially if recruiting objectives are to be achieved during the decline in the male youth population. Recruiting objectives are even more difficult to achieve with the present emphasis on enlisting high quality recruits.

The studies that have been done to date did not reach a consensus due to the reasons that were explained in Chapter I. These past studies have been lacking in two areas. First, difficulties were encountered in replicating the studies. If some of the past studies could be replicated using the same survey members and methodology, it would give more insight on the subject. Secondly, there is a lack of research using Military Occupational Specialties (MOS). Goldberg and Warner indicated that the effect of military service changes by occupational category. Further investigation on post-service earnings of veterans utilizing MOS would be valuable to this subject area.

Another kind of study that will be useful is a comparison of post service earnings of draft-era veterans with the subsequent earnings of All-Volunteer -Force era-veterans.

APPENDIX A
MARITAL STATUS BY RACE

NON-BLACK

	UNMARRIED	MARRIED	ROW TOTAL
NON-VETERAN	275.0	1121.0	1396.0
	15.1	61.4	76.5
VETERAN	68.0	362.0	430.0
	3.7	19.8	23.5
COLUMN TOTAL	343.0	1483.0	1826.0
	18.3	81.8	100.0

CHI-SQUARE	D. F.	SIGNIFICANCE
3.00	1	0.08

BLACK

	UNMARRIED	MARRIED	ROW TOTAL
NON-VETERAN	169.0	288.0	457.0
	29.2	49.7	78.9
VETERAN	42.0	80.0	122.0
	7.3	13.8	21.1
COLUMN TOTAL	211.0	368.0	579.0
	36.4	63.6	100.0

CHI-SQUARE	D. F.	SIGNIFICANCE
0.17	1	0.67

APPENDIX B
HEALTH LIMITATION BY RACE

NON-BLACK

	NO	YES	ROW TOTAL
NON-VETERAN	1392.0	149.0	1541.0
	69.2	7.4	76.6
VETERAN	433.0	37.0	470.0
	21.5	1.8	23.4
COLUMN TOTAL	1825.0	186.0	2011.0
	90.8	9.2	100.0

CHI-SQUARE	D. F.	SIGNIFICANCE
1.17	1	0.28

BLACK

	NO	YES	ROW TOTAL
NON-VETERAN	475.0	49.0	524.0
	71.3	7.4	78.7
VETERAN	134.0	8.0	142.0
	20.1	1.2	21.3
COLUMN TOTAL	609.0	57.0	666.0
	91.4	8.6	100.0

CHI-SQUARE	D. F.	SIGNIFICANCE
1.52	1	0.22

APPENDIX C
UNIONIZATION BY RACE

NON-BLACK

	NO	YES	ROW TOTAL
NON-VETERAN	1091.0	450.0	1541.0
	54.3	22.4	76.7
VETERAN	318.0	151.0	469.0
	15.8	7.5	23.3
COLUMN TOTAL	1049.0	601.0	2010.0
	70.1	29.9	100.0

CHI-SQUARE	D. F.	SIGNIFICANCE
1.40	1	0.24

BLACK

	NO	YES	ROW TOTAL
NON-VETERAN	350.0	173.0	523.0
	52.6	26.0	78.6
VETERAN	83.0	59.0	142.0
	12.5	8.9	21.4
COLUMN TOTAL	433.0	232.0	665.0
	65.1	34.9	100.0

CHI-SQUARE	D. F.	SIGNIFICANCE
3.16	1	0.08

APPENDIX D
REGION BY RACE

NON-BLACK

	NO	YES	ROW TOTAL
NON-VETERAN	1044.0	497.0	1541.0
	51.9	24.7	76.6
VETERAN	341.0	129.0	470.0
	17.0	6.4	23.4
COLUMN TOTAL	1385.0	626.0	2011.0
	68.9	31.1	100.0

CHI-SQUARE	D. F.	SIGNIFICANCE
3.66	1	0.06

BLACK

	NO	YES	ROW TOTAL
NON-VETERAN	145.0	379.0	524.0
	21.8	56.9	78.7
VETERAN	45.0	97.0	142.0
	6.8	14.6	21.3
COLUMN TOTAL	190.0	476.0	666.0
	28.5	71.5	100.0

CHI-SQUARE	D. F.	SIGNIFICANCE
0.70	1	0.40

APPENDIX E
WORKER IN RURAL AREA BY RACE

NON-BLACK

	NO	YES	ROW TOTAL
NON-VETERAN	1091.0	450.0	1541.0
	54.3	22.4	76.6
VETERAN	354.0	116.0	470.0
	17.6	5.8	23.4
COLUMN TOTAL	1445.0	566.0	2011.0
	71.9	28.1	100.0

CHI-SQUARE	D. F.	SIGNIFICANCE
3.42	1	0.06

BLACK

	NO	YES	ROW TOTAL
NON-VETERAN	336.0	188.0	524.0
	50.5	28.2	78.7
VETERAN	110.0	32.0	142.0
	16.5	4.8	21.3
COLUMN TOTAL	446.0	220.0	666.0
	67.0	33.0	100.0

CHI-SQUARE	D. F.	SIGNIFICANCE
8.40	1	0.00

APPENDIX F
WORKER IN SUBURB BY RACE

NON-BLACK

	NO	YES	ROW TOTAL
NON-VETERAN	819.0	722.0	1541.0
	40.7	35.9	76.6
VETERAN	244.0	226.0	470.0
	12.1	11.2	23.4
COLUMN TOTAL	1063.0	948.0	2011.0
	52.9	47.1	100.0

CHI-SQUARE	D. F.	SIGNIFICANCE
0.17	1	0.68

BLACK

	NO	YES	ROW TOTAL
NON-VETERAN	426.0	98.0	524.0
	64.0	14.7	78.7
VETERAN	110.0	32.0	142.0
	16.5	4.8	21.3
COLUMN TOTAL	536.0	130.0	666.0
	80.5	19.5	100.0

CHI-SQUARE	D. F.	SIGNIFICANCE
0.82	1	0.37

APPENDIX G
T-TEST RESULTS - NON-BLACKS

VARIABLE	NUMBER OF CASES	MEAN	F VALUE	2-TAIL PROB	T VALUE	2-TAIL PROB
AGE						
VET	470	32.99	1.39	0.01	-1.09	0.28
NON-VET	1541	33.17				
EDUC						
VET	470	13.62	1.76	0.01	-1.34	0.18
NON-VET	1541	13.80				
TENUR						
VET	469	5.93	1.38	0.01	-2.74	0.01
NON-VET	1540	6.67				
DPDN						
VET	468	1.56	1.29	0.01	-1.64	0.10
NON-VET	1537	1.68				
HOURS						
VET	470	43.40	1.89	0.01	-3.51	0.01
NON-VET	1541	44.88				
WRKEX						
VET	470	14.37	1.88	0.01	0.01	0.99
NON-VET	1541	14.37				
WEXSEMPL						
VET	470	51.40	2.05	0.01	-0.99	0.32
NON-VET	1541	51.58				
HWAGE						
VET	459	10.61	1.82	0.01	-0.17	0.86
NON-VET	1481	10.69				
EARN						
VET	431	21,904	1.53	0.01	-2.30	0.02
NON-VET	1418	23,151				

APPENDIX H
T-TEST RESULTS-BLACKS

VARIABLE	NUMBER OF CASES	MEAN	F VALUE	2-TAIL PROB	T VALUE	2-TAIL PROB
AGE						
VET	142	32.39	1.35	0.03	-1.72	0.09
NON-VET	524	32.90				
EDUC						
VET	142	13.06	2.19	0.01	5.10	0.01
NON-VET	524	11.76				
TENUR						
VET	141	5.85	1.45	0.01	-1.52	0.13
NON-VET	523	6.55				
DPDN						
VET	142	1.68	1.65	0.01	-2.53	0.12
NON-VET	524	2.07				
HOURS						
VET	142	42.80	2.44	0.01	-0.56	0.58
NON-VET	524	43.26				
WRKEX						
VET	142	14.34	2.11	0.01	-4.39	0.01
NON-VET	524	16.14				
WEXSEMPL						
VET	142	51.14	1.42	0.01	0.52	0.60
NON-VET	524	50.88				
HWAGE						
VET	137	7.92	1.22	0.16	2.70	0.01
NON-VET	499	7.09				
EARN						
VET	123	17,483	1.29	0.01	2.99	0.01
NON-VET	424	15,311				

APPENDIX I
DESCRIPTIVE STATISTICS FOR NON-BLACK - NON-VETERANS 1981

VARIABLE	MEAN	MINIMUM	MAXIMUM	VALID
AGE	33.17	29	39	1541
TENUR	6.67	0	21	1540
EDUC	13.08	0	18	1541
MRSTA	.80	0	1	1396
DPND	1.68	0	9	1537
HLTH	.10	0	1	1541
UNWAGE	.29	0	1	1541
SOUTH	.32	0	1	1541
RURAL	.29	0	1	1541
SUBRB	.47	0	1	1541
HOURS	44.88	35	100	1541
WRKEX	14.37	6	29	1541
WEKSEMPL	51.58	0	52	1541
HWAGE	10.69	3	275	1481
EARN	23,153	5,000	50,001	1418

APPENDIX J
DESCRIPTIVE STATISTICS FOR NON-BLACK VETERANS 1981

VARIABLE	MEAN	MINIMUM	MAXIMUM	VALID
AGE	32.99	29	39	470
TENUR	5.93	0	18	469
EDUC	13.62	9	18	470
MRSTA	.84	0	1	430
DPND	1.56	0	5	468
HLTH	.08	0	1	470
UNWAGE	.32	0	1	469
SOUTH	.27	0	1	470
RURAL	.25	0	1	470
SUBRB	.48	0	1	470
HOURS	43.40	35	75	470
WRKEX	14.37	6	23	470
WEKSEMPL	51.40	5	52	470
HWAGE	10.61	3	233	459
EARN	21,904	5,200	50,001	431

APPENDIX K
DESCRIPTIVE STATISTICS FOR BLACK NON-VETERANS 1981

VARIABLE	MEAN	MINIMUM	MAXIMUM	VALID
AGE	32.90	29	39	524
TENUR	6.55	0	20	523
EDUC	11.76	2	18	524
MRSTA	.63	0	1	457
DPND	2.07	0	9	524
HLTH	.09	0	1	524
UNWAGE	.33	0	1	523
SOUTH	.72	0	1	524
RURAL	.36	0	1	524
SUBRB	.19	0	1	524
HOURS	43.26	35	91	524
WRKEX	16.14	7	30	524
WEKSEMPL	50.88	4	52	524
HWAGE	7.09	3	24	499
EARN	15,311	5,000	50,001	424

APPENDIX L
DESCRIPTIVE STATISTICS FOR BLACK VETERANS 1981

VARIABLE	MEAN	MINIMUM	MAXIMUM	VALID
AGE	32.39	29	39	142
TENUR	5.85	0	16	141
EDUC	13.06	9	18	142
MRSTA	.66	0	1	122
DPND	1.68	0	5	142
HLTH	.06	0	1	142
UNWAGE	.42	0	1	142
SOUTH	.68	0	1	142
RURAL	.23	0	1	142
SUBRB	.23	0	1	142
HOURS	42.80	35	168	142
WRKEX	14.34	7	22	142
WEKSEMPL	51.15	0	52	142
HWAGE	7.92	3	17	137
EARN	17,483	5,400	34,000	123

APPENDIX M
DESCRIPTIVE STATISTICS FOR BLACKS 1981

VARIABLE	MEAN	MINIMUM	MAXIMUM	VALID
AGE	32.79	29	39	666
TENUR	6.40	0	20	664
EDUC	12.04	2	18	666
MRSTA	.64	0	1	579
HLTH	.09	0	1	666
UNWAGE	.35	0	1	665
SOUTH	.71	0	1	666
RURAL	.33	0	1	666
SUBRB	.20	0	1	666
WEKSEMPL	50.94	0	52	666
HWAGE	7.27	3	24	636
TENU2	64.45	0	400	664
NVVET	.21	0	1	666

APPENDIX N
DESCRIPTIVE STATISTICS FOR NON-BLACKS 1981

VARIABLE	MEAN	MINIMUM	MAXIMUM	VALID
AGE	33.13	29	39	2011
TENUR	6.50	0	21	2009
EDUC	13.76	0	18	2011
MRSTA	.81	0	1	1826
HLTH	.09	0	1	2011
UNWAGE	.30	0	1	2010
SOUTH	.31	0	1	2011
RURAL	.28	0	1	2011
WEKSEMPL	51.54	0	52	2011
TENU2	68.67	0	441	2009
HOURS	44.54	35	100	2011
NVVET	.21	0	1	666
EARN	22,862	5,000	50,001	1849

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